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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Chien Chou

CU-2480 RJS

2055

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12/28/2004

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EXAMINER

PERILLA, JASON M

ART UNIT

PAPER NUMBER

2634

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/804,830

Applicant(s)

CHOU, CHIEN

Examiner

Jason M Perilla

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,7,9,13,20,21 and 25 is/are rejected.
- 7) ☒ Claim(s) 2,3,5,6,8,10-12,14-19,22-24 and 26-28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-28 are pending in the instant application.

Response to Amendment

2. The indicated allowability of claims 1 and 7 are withdrawn in view of the newly discovered reference(s) to Yoshida (US 6018391) and Ono (US 5295013). Rejections based on the newly cited reference(s) follow.

Claim Objections

3. Claims 1-28 are objected to because of the following informalities:

Regarding claim 1, in lines 8-9, "receiving amplitude-adjusted" should be replaced by --receiving the amplitude-adjusted--.

Regarding claim 4, lines 4-5, are unclear because "to extend range of measurable phase change" is not easily understood, and more than one interpretation may apply.

Regarding claim 5, in line 1, "the phase difference" should be replaced by -- wherein the phase difference--, in line 2, "being equal to" should be replaced by --is equal to--, and in line 6, "the instantaneous frequency" is lacking antecedent basis.

Regarding claim 7, in line 5, "a function of frequency, time, and phase difference" should be replaced by --a function of a frequency, a time, and a phase difference between the two mutually orthogonal polarized optical signals—to make the claim language more definite.

Regarding claim 9, in line 3, "said light source" should be replaced by --said coherent light source--, in lines 9-10, "a function of the beat frequency, time, and phase

difference” should be replaced by –a function of a beat frequency, a time, and a phase difference—to make the claim language more definite, and, in line 12, “photo detecting means” should be replaced by –a photo detecting means--.

Regarding claim 10, in line 2, “said light source” should be replaced by –said coherent light source--, in line 4, “adjusting azimuth” should be replaced by –adjusting an azimuth—and “said light source” should be replaced by –said coherent light source--, and, in lines 7 and 8, “of mutually orthogonal” should be replaced by –of the mutually orthogonal--.

Regarding claim 11, in line 4, “adjusting optical” should be replaced by –adjusting an optical--.

Regarding claim 12, in line 4, “determining direction” should be replaced by –determining a direction--.

Regarding claim 13, lines 4-5, are unclear because “to extend range of measurable phase change” is not easily understood, and more than one interpretation may apply.

Regarding claim 17, in line 2, “said light source” should be replaced by –said coherent light source--, in line 4, “adjusting azimuth” should be replaced by –adjusting an azimuth—and “said light source” should be replaced by –said coherent light source--, and, in lines 7 and 8, “of mutually orthogonal” should be replaced by –of the mutually orthogonal--.

Regarding claim 18, in line 2, “adjusting optical” should be replaced by –adjusting an optical--.

Regarding claim 19, in line 4, "determining direction" should be replaced by – determining a direction--.

Regarding claim 20, lines 4-5, are unclear because "to extend range of measurable phase change" is not easily understood, and more than one interpretation may apply.

Regarding claim 21, in line 3, "said light source" should be replaced by –said coherent light source--, in lines 9-10, "a function of the beat frequency, time, and phase difference" should be replaced by –a function of a beat frequency, a time, and a phase difference—to make the claim language more definite, and, in line 11, "photo detecting means" should be replaced by –a photo detecting means--.

Regarding claim 23, in line 2, "adjusting optical path" is replaced by –adjusting an optical path--.

Regarding claim 24, in line 4, "determining direction" should be replaced by – determining a direction--.

Regarding claim 25, lines 4-5, are unclear because "to extend range of measurable phase change" is not easily understood, and more than one interpretation may apply.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 4, 13, 20 and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 4, the claim is indefinite because claim 1 limits the phase difference to a particular value but claim 4 further limits the phase difference to another value. Because the phase difference may only be defined as one particular difference clearly, it is unclear what the value of the phase difference is to be defined as. Further regarding claim 4, the amplitude-modulated signal output is defined in claim 1 although it is further defined in claim 4. The actual value of the amplitude-modulated signal is unclear because it may only have one value although it is defined as having two by the claim.

Regarding claims 13, 20, and 25, the claims are indefinite for the same reasons as applied to claim 4 above.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ono in view of Bursztejn et al (US 4559499; hereafter "Bursztejn")

Regarding claim 1, Ono discloses by figure 1, a phase demodulator for measuring a phase difference between a phase-modulated test signal (first output of

the differential amplifier. Because the purpose of the differential amplifier of Ono is to control the phase difference between the test and reference signals (col. 4, lines 45-55), it is obvious that the differential amplifier should receive signals which contain only a difference in phase rather than a difference in both phase and amplitude. Bursztejn teaches by figure 1 an automatic gain correction (AGC) circuit (refs. 8-10) which corrects for gain differences between two signals before a phase difference (11) is calculated between them. The AGC circuit of Bursztejn is utilized such that the phase difference detector detects only a phase difference and not a difference in amplitude between the two input signals $X(t)$ and $Y(t)$. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize an amplitude control device as taught by Bursztejn in the demodulator of Ono before the calculation of the phase difference between the test and reference signals by the differential amplifier because a more accurate detection of a true phase difference could be made without a difference in amplitude between the test and reference signals.

8. Claims 7, 9, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida (US 6018391) in view of Ono.

Regarding claim 7, Yoshida discloses by figure 4 a phase difference detector (14) adapted for use with a polarized optical interferometer (3, 5, 10, and 18) that generates two mutually orthogonal polarized optical signals by a polarization divider (3), at least one of which is incident upon a test object (21), the optical signals having equal intensities and carrier frequencies (col. 7, line 15 – col. 8, line 35) and being processed to obtain two electrical signals (outputs of 11; col. 7, line 15 – col. 8, line 35) that are a

"POLARIZATION DIVIDER" 23) and a phase-modulated reference signal (second output of "POLARIZATION DIVIDER" 23), the test and reference signals having fixed carrier frequencies comprising: a differential amplifier (26) for receiving the test and reference signals, for obtaining an intensity difference between the test and reference signals (fig. 3; col. 4, lines 14-30), and for amplifying the intensity difference; and a signal processing device (27 and 28) including an amplitude demodulator (27) coupled to said differential amplifier, said amplitude demodulator demodulating the amplitude-modulated output from said differential amplifier to obtain an output that is related to the phase difference (col. 4, lines 30-36). As broadly as claimed, the test and reference signals are generated as the outputs of the divider 23 of figure 1 (col. 4, lines 3-6). The modulation technique used by the transmitter 1 of figure 1 is frequency shift keying or FSK (col. 3, lines 8-13). Because the method of modulation is FSK, the test and reference signals have a fixed carrier frequency to allow for FSK modulation to be performed. Further, it is inherent that the phase difference between the test and reference signal is the phase of the test signal minus the phase of the reference signal as claimed. The differential amplifier 26 amplifies the difference in phase or creates an intensity difference between the two outputs of the polarization divider 23. It is inherent that the intensity difference of the amplifier would be amplified by the gain of the amplifier to arrive at the claimed output (i.e. line 12 of the claim) because the definition of a differential amplifier is simply an amplifier which amplifies, by a predetermined gain, a difference in two signals. One does not disclose an amplitude control device for adjusting the amplitudes of the test and reference signals before they are amplified by

function of a frequency, a time, and a phase difference between the two mutually orthogonal polarized optical signals, said phase difference detector comprising: an amplifier (13) adapted to receive the electrical signals, to obtain an intensity difference between the electrical signals (col. 8, lines 1-35), and to amplify the intensity difference to generate an amplitude-modulated output that is a function of a phase difference between the electrical signals; and a signal processing device (14). Yoshida does not explicitly disclose that (1) said phase difference detector is comprising: a differential amplifier adapted to receive the electrical signals and to obtain an intensity difference between the electrical signals or that (2) the phase difference detector is comprising an amplitude demodulator coupled to said differential amplifier, said amplitude demodulator demodulating the amplitude-modulated output from said differential amplifier to obtain an output that is related to the phase difference. However, Ono discloses by figure 2 a differential amplifier (26) for receiving the test (24) and reference (25) signals, for obtaining an intensity difference between the test and reference signals (fig. 3; col. 4, lines 14-30), and for amplifying the intensity difference; and a signal processing device (27 and 28) including an amplitude demodulator (27) coupled to said differential amplifier, said amplitude demodulator demodulating the amplitude-modulated output from said differential amplifier to obtain an output that is related to the phase difference (col. 4, lines 30-36). Ono discloses a simple and exemplary method of the detection of a phase difference between electrical signals. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize the differential amplifier and amplitude demodulator of Ono in the phase difference

detector of Yoshida because it is an accurate and simple method of detecting a phase difference between electrical signals.

Regarding claims 9 and 21, Yoshida in view of Ono disclose the limitations of the claims as applied above in claim 7. Further, Yoshida discloses a coherent light source (fig. 4, ref. 1) and photo detecting means for converting the optical heterodyned signals into electrical signals (fig. 4, ref. 12).

Allowable Subject Matter

9. Claims 2-3, 5-6, 8, 10-12, 14-19, 22-24, and 26-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following prior art of record not relied upon above is cited to further show the state of the art with respect to optical phase difference detectors.

U.S. Pat. No. 5486919 to Tsuji et al.

U.S. Pat. No. 4842408 to Yoshii et al.

U.S. Pat. No. 5473457 to Ono.

U.S. Pat. No. 5052051 to Naito et al.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M Perilla whose telephone number is (571) 272-3055. It is requested by the Examiner that the Applicant contacts the Examiner by

phone before a reply to this office action is filed. The examiner can normally be reached on M-F 8-5 EST.

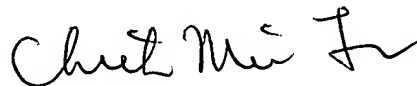
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jason M. Perilla
December 20, 2004

jmp



CHIEH M. FAN
PRIMARY EXAMINER